

## **Experiment No: 03**

**Experiment Name:** Experiment of Subnetting.

### **Theory:**

IPv4 addressing divides networks into subnets for efficient use of IP space. Subnetting reduces broadcast traffic and improves management by breaking a larger network into smaller segments. Each subnet is defined by a subnet mask, which determines the network and host portions of the address.

- **Fixed-Length Subnet Masking (FLSM):** Uses equal subnet sizes for all subnets.
- **Variable-Length Subnet Masking (VLSM):** Allocates subnets of different sizes based on network requirements.

Routers are used to interconnect subnets and enable communication between them. Proper subnetting improves network performance, scalability, and manageability.

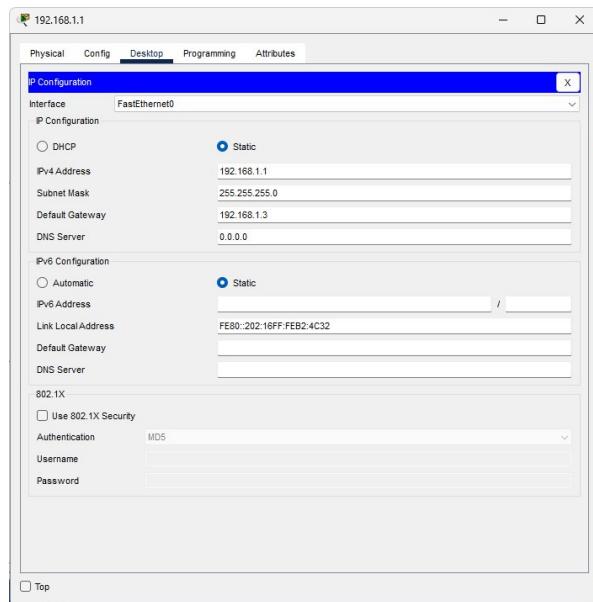
### **Components:**

1. Cisco Packet Tracer software
2. Routers
3. Switches
4. PC/Desktop
5. Ethernet cables for device interconnections
6. Static IP configuration for PCs and router interfaces

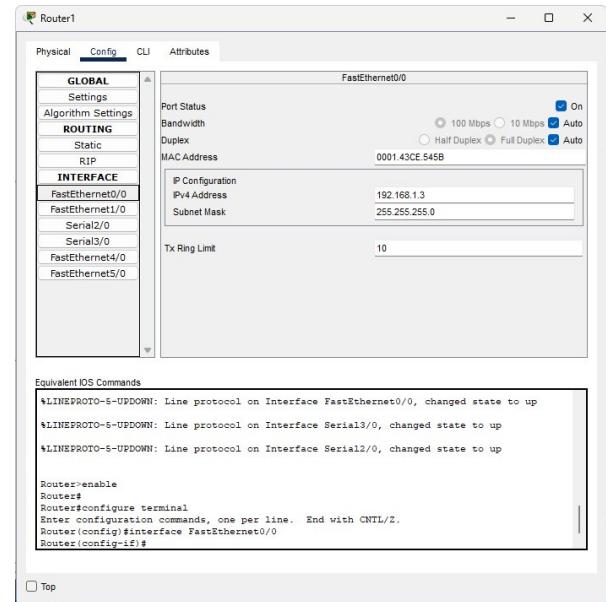
### **Procedure:**

#### **Task-01: 1 Router, 2 Switches, 4 PCs**

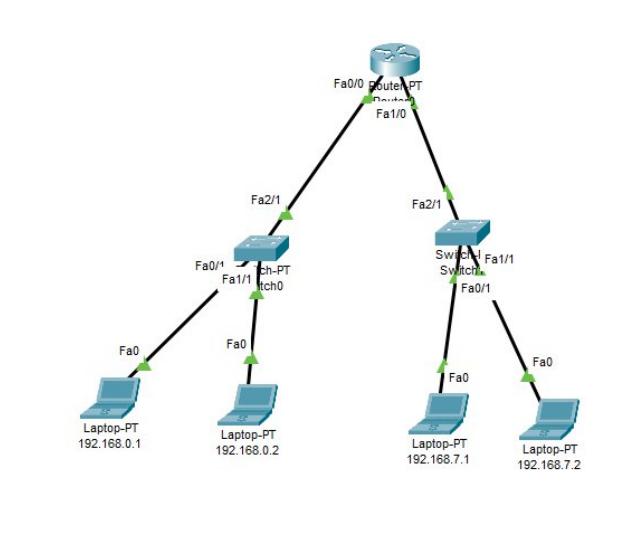
1. Place one router, two switches, and four PCs in the Packet Tracer workspace.
2. Connect the router to the two switches using Ethernet cables on its Gigabit Ethernet interfaces.
3. Attach two PCs to each switch using straight-through cables.
4. Subnet the network 192.168.0.1 and 192.168.1.1 into two equal parts using a IP address :
  - Subnet A: 192.168.0.1/2 → Router F0/0: 192.168.0.3
  - Subnet B: 192.168.7.1/2 → Router F0/1: 192.168.7.3
5. Configure static IP addresses on all PCs, ensuring that each PC uses the router interface of its subnet as the default gateway.
6. Verify connectivity by performing pings:
  - Between PCs in the same subnet (local communication through the switch).
  - Between PCs in different subnets (inter-subnet communication through the router).
7. Successful ping replies confirm correct subnetting and routing.



**Figure-01:** IP Configuration Interface.



**Figure-02:** Default IP Address Interface.

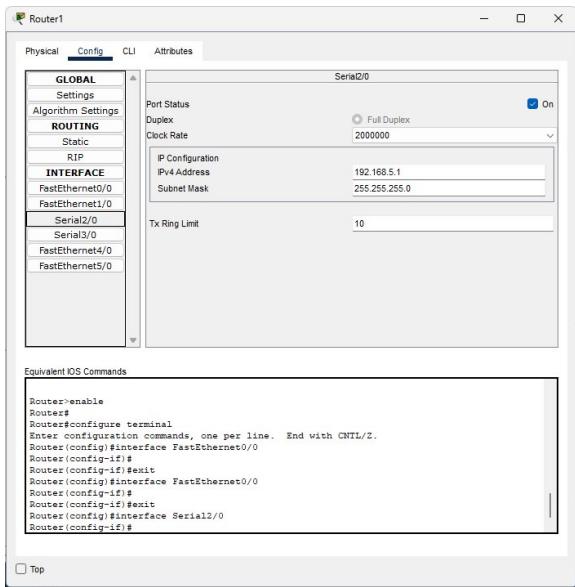


Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
Successful		192.168.0.1	192.168.0.2	ICMP	0.000	N	0	(edit)		
Successful		192.168.0.2	192.168.7.1	ICMP	0.000	N	1	(edit)		
Successful		192.168.0.2	192.168.7.2	ICMP	0.000	N	2	(edit)		
Successful		192.168.7.1	192.168.0.2	ICMP	0.000	N	3	(edit)		

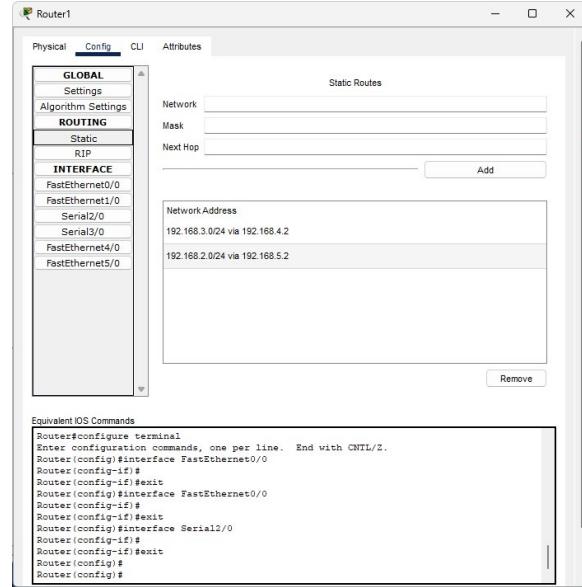
**Figure-03:** 1 Router, 2 Switches, 4 PCs Connection.

## **Task-02: 3 Routers, 3 Switches, 6 PCs**

- Three routers, three switches, and six PCs were placed in Cisco Packet Tracer.
  - The routers were connected in a triangular topology using serial interfaces.
  - Each router's Fast Ethernet (Fa0/0) interface was connected to a switch, and two PCs were connected to each switch.
  - LAN gateway addresses were assigned as follows:
    - R1 Fa0/0 → 192.168.1.3
    - R2 Fa0/0 → 192.168.3.3
    - R3 Fa0/0 → 192.168.2.3
  - Serial link addresses were configured as follows:
    - R1–R2 → 192.168.4.1, 192.168.4.2
    - R1–R3 → 192.168.5.1, 192.168.5.2
    - R2–R3 → 192.168.6.1, 192.168.6.2

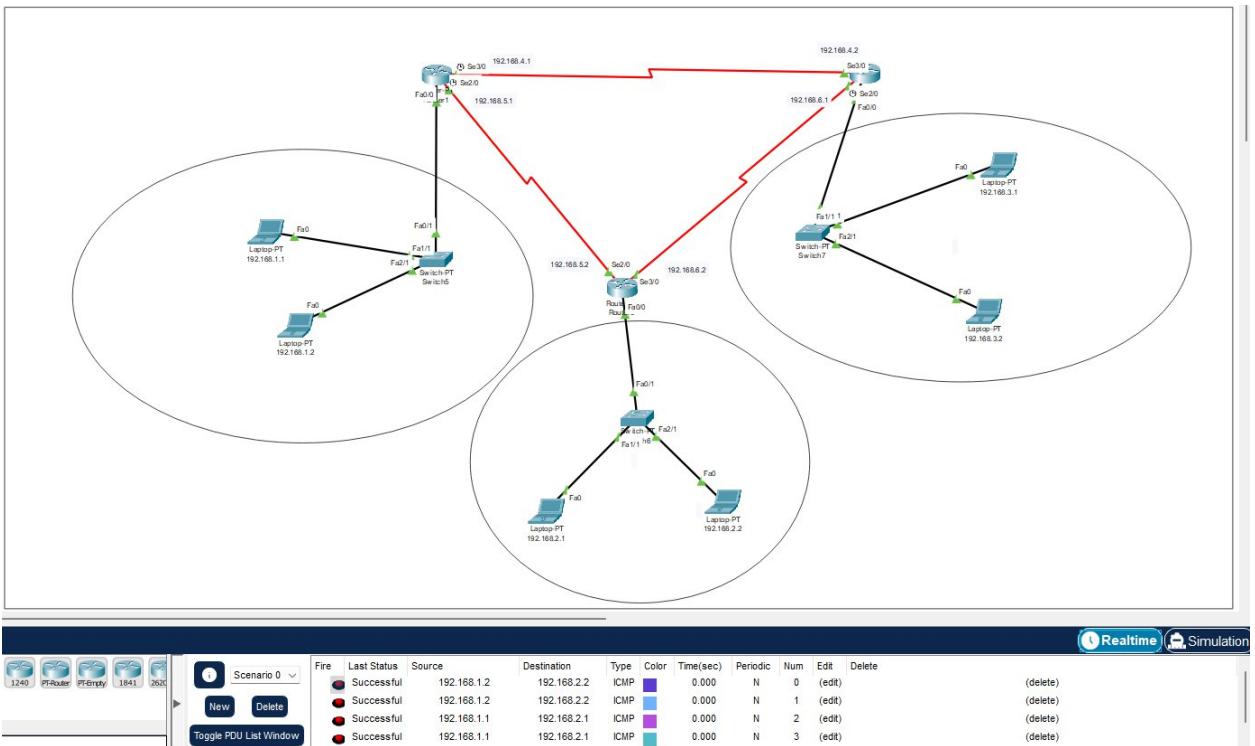


**Figure-04:** Router to Router Connections.



**Figure-05:** Router to LAN Connections.

6. PCs were assigned IP addresses within their LAN subnets and configured with their router's Fa0/0 as the default gateway.
  7. Static routes were added to each router to enable full network communication:
    - R1 → Routes to LAN2 and LAN3
    - R2 → Routes to LAN1 and LAN3
    - R3 → Routes to LAN1 and LAN2
  8. Finally, connectivity was tested and verified using ping between PCs located in different LANs.



**Figure-06:** 3 Router, 3 Switches, 6 PCs Connection.

### **Conclusion:**

Both topologies were successfully implemented in Cisco Packet Tracer using static IP addressing.

- Task 1 demonstrated simple subnetting with a single router connecting multiple LANs.
- Task 2 illustrated a larger network design with VLSM and static routing between multiple routers.

Ping tests verified communication within and across subnets, confirming that subnetting and routing objectives were successfully achieved. The lab reinforced the importance of proper IP addressing, subnetting, and static routing in designing scalable and functional networks.